VASQUEZ PROJECT - GROUNDWATER RESTORATION COST CALCULATION BY ZONE
WATER PUMPING AND TREATMENT ONLY

WELLFIELD 1

ZONE	AREA 1N2	MULT.	MULT.	FT2	THICK	VOLUME	POR.	CONV.	PV	HDF	VDF	RV	CONV	4PV	$/1000	COST
MIDDLE	67.75	100	100	677500	7.4	5013500	0.3	7.48	11250294	1.5	1.3	21938073.3	0.001	4	1.93	$169,361.93
UPPER LOWER	10.58	100	100	105800	7.4	782920	0.3	7.48	1756872.5	1.5	1.3	3425901.34	0.001	4	1.93	$26,447.96
LOWER LOWER	37.35	100	100	373500	7.4	2763900	0.3	7.48	6202191.6	1.5	1.3	12094273.6	0.001	4	1.93	$93,367.79
TOTALS	115.68			1156800		8560320			19209358			37458248.3				$289,177.68

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TABLE 2 Lixiviant Composition and Concentration

CHEMICAL SPECIES	RANGE Low*	High*
Ca	15	600
Mg	5	100
Na	300	750
K	8	40
CO_3	0	0
HCO_3	275	1000
SO_4	150	1000
Cl	200	1000
F	0.50	.50
NO_3 -N	0.80	.5
SiO_2	39	40
TDS	1000	5000
pH	6	10
Mo	0.01	5
U	0.001	5

* All values in mg/l except for pH.

4.5 Waste Retention Ponds

One to three waste holding pond(s) is to be used at the Vasquez Leach Project. The Pond will be constructed in such manner that at maximum normal operating depth (7') pond fluids will not be above surrounding ground level (Figure 20). Embankments above ground level will be composed of compacted sand and caliche derived from pit excavation. Thirty-six mil reinforced hypalon will overlay all water retention surfaces. An additional thirty mil CPVD liner will underlay the leak detection system.

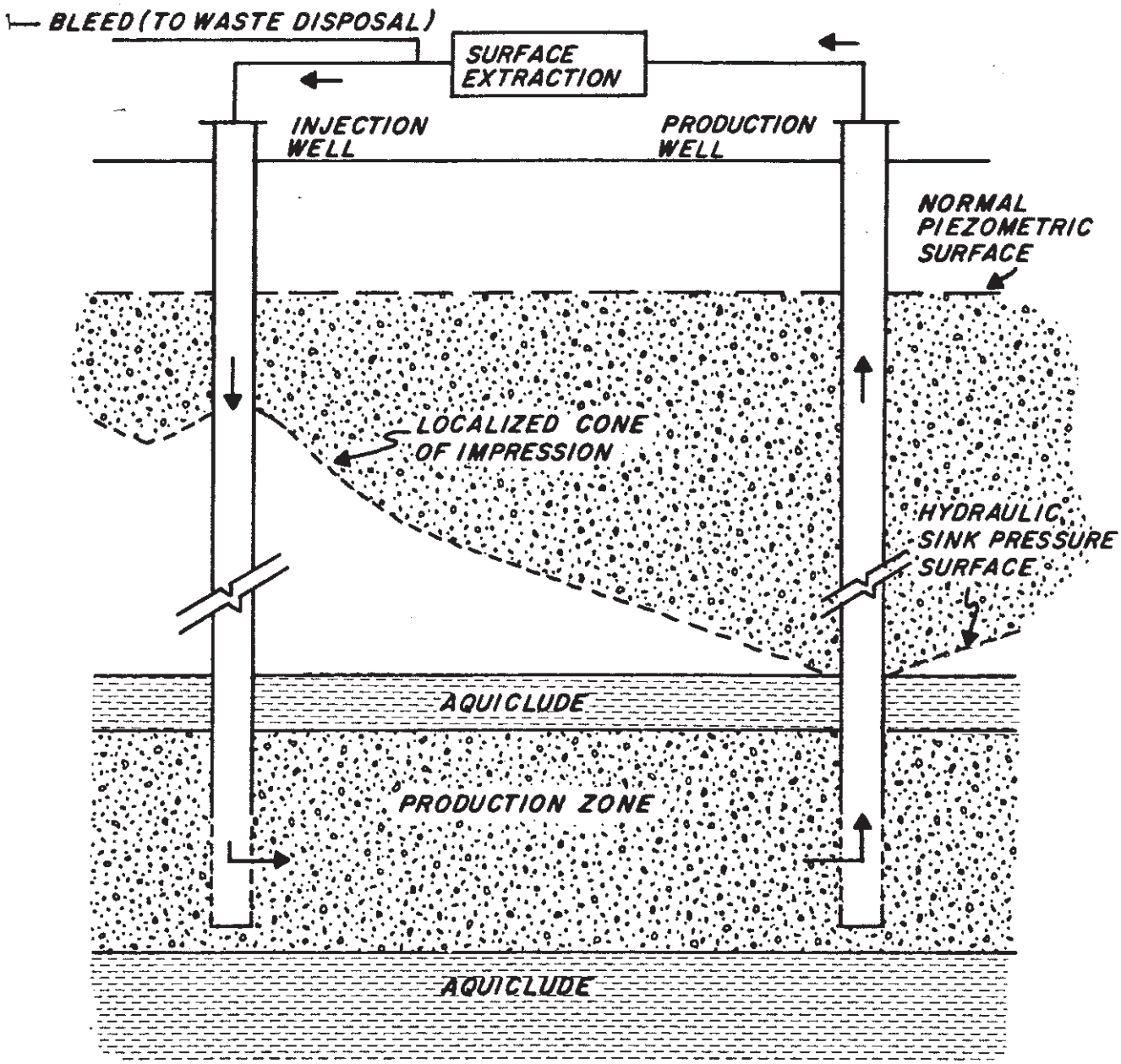

FIGURE 21

URI INC.

VASQUEZ PROJECT

SCHEMATIC CROSS-SECTION
INJECTION/PRODUCTION
BLEED/HYDRAULIC RESPONSE

An excursion corrective action report will be submitted to the State of Texas two weeks after initial excursion confirmation. The report will include measures taken in the previous two weeks and planned corrective measures to be taken in the following month. Such reporting will continue until water quality values are below upper control limits specified under 4.8.1.

4.9 Restoration

4.9.1 Description of Process

Restoration of the production zone will be achieved by reverse osmosis (R.O.) treatment. As discussed earlier in this Chapter, 200 gallons per minute of groundwater will be extracted from the mined zone. This water will be pumped through the ion exchange facility where residual uranium is extracted, and the groundwater will be processed by R. O. treatment. Following R. O. treatment there will be two grades of water, product or deionized water and reject or brine. The deionized water will be reinjected into the mined zone at a rate of 133 gallons per minute which will enhance restoration directly by sweeping the wellfields. The brine will be disposed of by deep well injection.

4.9.2 Reverse Osmosis Operation Principles

Osmosis is a natural process that occurs in all living cells. With an appropriate semi-permeable membrane as a barrier to solutions of differing concentrations, naturally occurring osmotic pressure forces pure water from the dilute solution to pass through the membrane and dilute the more concentrated solution. This process will continue until an equilibrium exists between the two solutions.

Reverse osmosis (R.O.) is a reversal of the natural osmotic process. By applying an opposite pressure greater than the natural occurring osmotic pressure on water containing dissolved solids, the majority of this water is passed through the membrane resulting in the concentration of the original solution. The membrane rejects the passage of the majority of the dissolved solids while concurrently permitting the passage of water.

Reverse osmosis has been evolving since its inception during the mid-sixties. Originally, very high pressures were needed to produce water of sufficient quantity and quality which translated into exorbitant electrical costs. However, with the advent of Thin Film Composite membranes, the required pressures needed to sustain commercial operations have been greatly reduced. On this basis alone, there has been a resurgence of interest in utilizing reverse osmosis for most water purification projects.

URI plans to utilize spiral wound polyamide thin film composite membranes or equivalent for the Vasquez solution mining project. These membranes were selected primarily due to their inherent rejection characteristics for the full range of dissolved solids and low pressure operating requirements. Spiral wound membranes have a greater ability to flush particulates through to brine (i.e. non-fouling) unlike their predecessor, the hollow filament membranes which were easily plugged by precipitates and other micron size debris.

RW

- Chloride -

Anion exchange species for the uranyl tricarbonate complexed anion is chloride. Chloride concentrations exchanged into aquifer mine fluids cause buildup of chloride in the production zone. These concentrations may exceed baseline by a factor of three. Therefore, chloride increases in monitor wells to levels well above baseline would indicate the possibility of an excursion.

- Uranium -

Economic in situ leach operations require that uranium concentrations in production solutions must exceed baseline condition by at least two or more orders of magnitude. Therefore, uranium concentration significantly exceeding baseline conditions would be an excellent indicator of possible mine fluid excursion.

Production and non-production zone monitor wells will be sampled every two weeks coincident with discontinuous water level measurements. All samples will be analyzed within 24 hours and recorded within three days on appropriate forms. If any one sample has a chemical level quality or species above a predetermined level, a verifying analysis will be performed. If the results of the verifying analysis are above upper control limits it will be assumed that an excursion has occurred. These levels are:

Conductivity: Maximum Baseline (umhos) + 25%
Chloride: Maximum Baseline (mg/l) + 25%
Uranium: Baseline + 5 mg/l

These levels are the maximum concentrations for the production zone aquifer plus deviation for laboratory error. All monitor well analysis data will be kept on site for inspection and will be reported to the State of Texas monthly on prescribed forms.

4.8.2 Corrective Action Measures

If abnormal formation pressuring occurs without attendant chemical increases in the monitor wells, corrective action will consist of greater bleed stream extraction. If one or more monitor wells have chemical levels exceeding the excursion determining threshold a second sample will be taken within 24 hours of the initial sampling. If analysis of the second sample shows that the chemical levels of the first were the result of improper sampling, faulty analysis or similar phenomena, no further action will be taken. If the second analysis produces results substantiating the first one, the TNRCC will be so notified by telephone within one working day and by written communication within two working days of confirmation.

Simultaneously, operations will increase the bleed extraction and continue monitoring the affected well(s) every other day until the monitor well values of conductivity, chloride and uranium are below excursion threshold values, and values consistent with current local baseline water quality as confirmed by three consecutive daily samples for the control parameters.

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An excursion corrective action report will be submitted to the State of Texas two weeks after initial excursion confirmation. The report will include measures taken in the previous two weeks and planned corrective measures to be taken in the following month. Such reporting will continue until 90% reduction is achieved on a monthly basis.

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FIGURE 22

SCHEMATIC FLOW DIAGRAM FOR ROSITA PROJECT REVERSE OSMOSIS UNIT

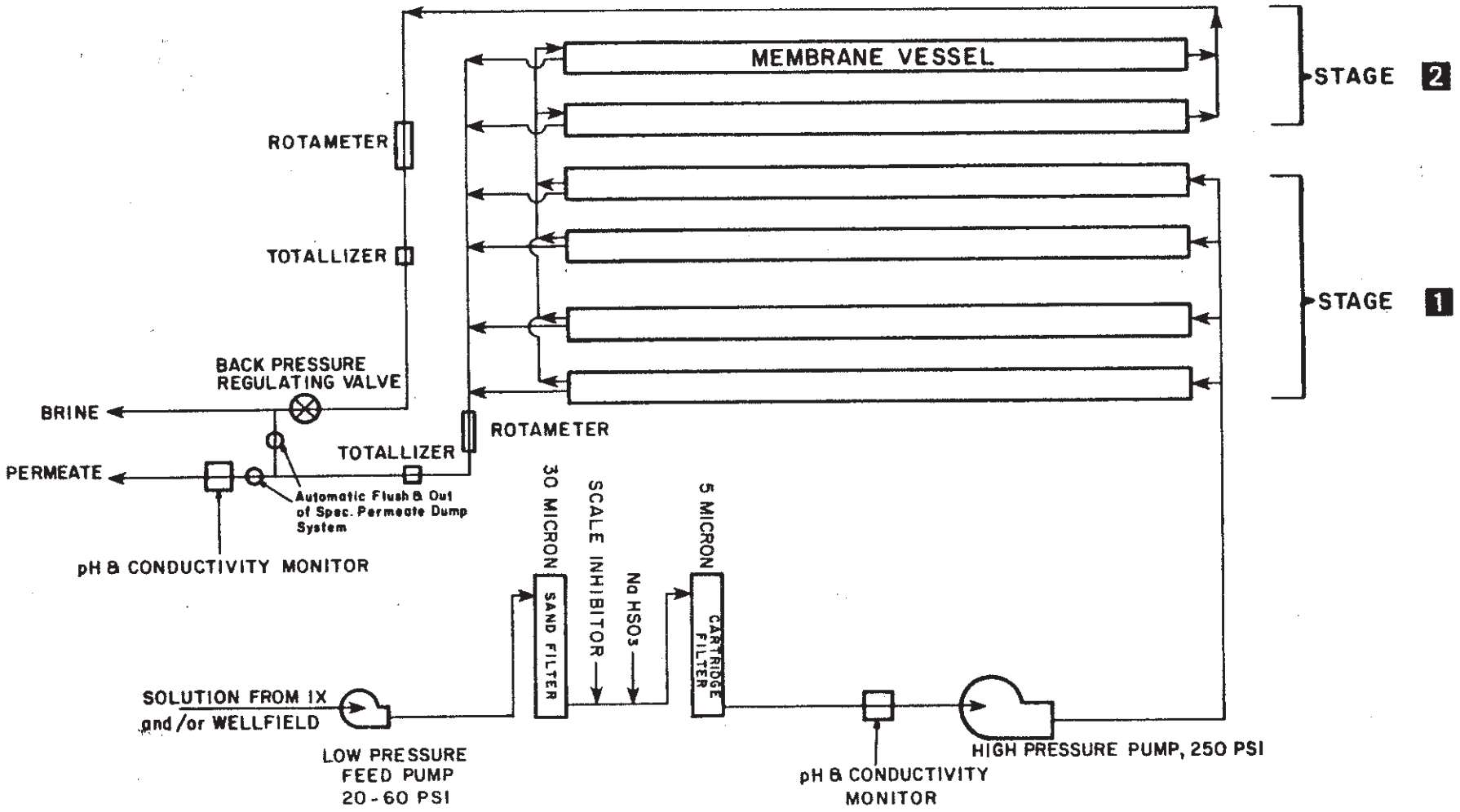

Table 4 Primary Restoration Parameter

Ca	CO_3	Ec @ 25 C
Mg	HCO_3	
Na	SO_4	
K	CL	pH

If the wellfield value for each chemical parameter is consistent with baseline quality, restoration is considered to be completed.

At such time, the state will be notified and a time selected for split sample collection. Three sample sets will be taken at one month intervals from the original baseline wells. Providing no significant changes exist between the first two analyses, the third sample set will be analyzed for the minor and trace constituents originally reported (Table 5). If the major and minor constituents reported for all three sample sets are within the restoration limit, restoration is complete and no further obligation for continued subsurface restoration is required.

Table 5 Minor and Trace Restoration Parameter

Fluoride	As	Mo
Nitrate	Cd	Hg
S_1O_2	Fe	Se
TDS	Pb	U
Alkalinity	Mn	Ra-226
Ammonia		

If restoration efforts are initiated and are ongoing and the values of the parameters describing water quality have stabilized for a period of 180 days, and the ground water would be suitable for any use to which it was reasonably suited prior to mining, negotiation will be conducted with the TNRCC to discuss if restoration is complete.

Rev.

TABLE 4 Primary Restoration Parameter

Ca	CO_3	Nitrate	Ec @ 25 C
Mg	HCO_3	S_iO_2	Ec (dilute)
Na	SO_4	TDS @ 180	Alk. as $CaCO_3$
K	CL		

If the well field value for each chemical parameter is consistent with baseline quality, restoration is considered to be completed.

At such time, the state will be notified and a time selected for split sample collection. Three sample sets will be taken at one month intervals from the original baseline wells. Providing no significant changes exist between the first two analyses, the third sample set will be analyzed for the minor and trace constituents originally reported (Table 5). If the major and minor constituents reported for all three sample sets are within the restoration limit, restoration is complete and no further obligation for continued subsurface restoration is required.

TABLE 5 Trace Restoration Parameter

As	Mo
Cd	Se
Fe	U
Pb	Ra226
Mn	

If restoration efforts are initiated and are ongoing and the values of the parameters describing water quality have stabilized for a period of 90 days and the groundwater would be suitable for any use to which it was reasonable suited prior to mining, negotiation will be conducted with the Department to discuss if restoration is complete.

4.9.6 Fluid Handling Capacity

Restoration fluids produced by this restoration technique will be disposed of by deep well injection. Deep well injection will account for all fluid handling capacity throughout the life of the project.

The assumptions which were utilized in calculating the disposal requirements were a follows:

ITEM	VOLUME	EXPLANATION
Bleed 1/1/97 - 1/1/99	20gpm	Plant operating at 2000 gpm No R.O. treatment of Bleed
1/1/99 - 1/1/00		Plant operating at 2000 gpm. R.O. producing 66 gpm brine.

The disposal capacity at the project will be 200 gpm plus any additional capacity due to evaporation. During restoration, the restoration water will account for 66 gpm disposal. Therefore, the project is designed to conservatively dispose of all wastes that will be generated.